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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,147	11/12/2003	Kazuaki Ano	TI-36575	6074

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EXAMINER

EDMONDSON, LYNNE RENEE

ART UNIT PAPER NUMBER

1725

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/706,147

Applicant(s)

ANO, KAZUAKI

Examiner

Lynne Edmondson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☒ Claim(s) 58-60 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 6-10, 13, 16, 19-23, 34, 37, 38, 39, 42-44, 46-51 and 54-56 are rejected under 35 U.S.C. 102(e) as being anticipated by Ihara et al. (US 2003/0096495 A1).

Ihara teaches a method of forming a solder joint on a Cu connection comprising the steps of applying a thin Ni layer, a diffusion layer and a Pb free solder (paragraph 42) which is reflowed to form the solder joint. The Ni layer is greater than 0.05 microns thick (paragraph 67). The diffusion layer comprises Au and Pd (paragraph 42) with a thickness of 0.05 to 0.2 microns (paragraphs 15, 16 and 67).

3. Claims 1, 2, 9-16, 22-28, 30, 32-39, 45-51 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by Takahashi et al. (US 2003/0193094 A1).

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Takahashi teaches a method of forming a solder joint on a Cu connection comprising the steps of applying a thin Ni layer, a diffusion layer and a Pb free solder containing Pd (paragraph 25) which is reflowed to form the solder joint (paragraphs 28 and 56-58). The Ni layer is greater than 0.05 microns thick (paragraph 69). The diffusion layer (4) comprises Au (paragraph 57). Reflow forms an intermetallic compound (paragraph 19). Intermediate Ni and Cu layers are applied (paragraphs 90-98).

4. Claims 1-5, 11-18, 24, 25, 28-32, 34-36, 39-41, 46-48 and 51-53 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al. (USPN 6642079 B1).

Liu teaches a method of forming a solder joint on a Cu connection comprising the steps of applying a thin Ni layer, a Cu diffusion layer and a Pb free solder which is reflowed to form the solder joint. The Ni layer is between 0.05 and 0.20 microns thick. (col 4 lines 1-35 and figures 3 and 4). Reflow forms an intermetallic compound (col 2 lines 12-31 and col 2 line 65 – col 3 line 9) comprising undulations (218, col 4 line 62 – col 5 line 3 and figure 4).

#### ***Allowable Subject Matter***

5. Claims 58-60 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Conclusion**

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamaguchi et al. (US 2004/0155336 A1, solder joint, layers, diffusion layer thickness, intermetallic, Au), Nakamura (US 2003/0143419 A1, solder joint, layers, diffusion layer thickness, intermetallic, Au), Andricacos et al. (USPN 6224690 B1), Copeland et al. (USPN 6596621 B1), Yamaguchi et al. (US 200380121959 A1) and Nakamura (US 2004/0026769 A1).

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynne Edmondson whose telephone number is (571) 272-1172. The examiner can normally be reached on Monday through Thursday from 6:30 a.m. to 5 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lynne Edmondson  
Primary Examiner  
Art Unit 1725

LRE

LYNNE R. EDMONDSON  
PRIMARY EXAMINER

*NE*  
*11/14/01*